

Data in AIDC Devices Overview

Rob Hampe

**NAVSEA AIDC Project Office
Support Staff**

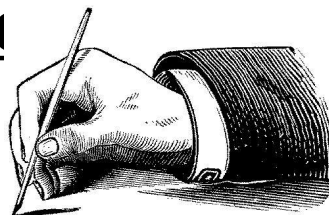


Over Reliance on Manual Data Entry

average 1 error in approximately **80-100** key strokes

1234F4FS4D4F44G4SD4SDFG4S4DG4G4GG77G44G774
65DD4DHJJ5D5S5E5THG1H4G56R6D2DFG4G5G5F6D6
5G5G5G5T8T8YY5F5FF21FFFF5F52225555G22G5G5F4F
G2G55FF2R2R5F85FF22F5G5T5TTTT52T3467589545134
5545354562452458456845145D5G5JH5J5DFGDFG5DFGS
52456555245526623823848235262225456824852/2456522
5634546345645344413425616134526437838RTYTERTTY
FYYYY3567LDFDF4467456735923-02L23452342345332

- **70%** of data hand keyed into computers came from another user



The Goal of AIDC



Automation

- “In manufacturing, a system or method in which many or all of the processes of production, movement and inspection of parts and materials are automatically performed or controlled by self-operating machinery, electronic devices, etc.”
- “Any system or method resembling this in using self-operating equipment, electronic devices, etc. to replace human beings in doing routine, repetitive, or dangerous work.”
- “The condition of being automated.”



DoD Definition **Automatic Identification Technology** **(Automatic Identification Data Capture)**

“ AIT (AIDC) is a suite of technologies that enable the automatic capture of source data, thereby enhancing the ability to identify, track, document and control deploying and redeploying forces, equipment, personnel and sustainment cargo. ”

DoD Logistics AIT CONOPS - November 1997

AIT devices can automatically identify,
locate/track,
and monitor supplies and equipment

AIT or AIDC

AUTOMATIC IDENTIFICATION TECHNOLOGY

What is AIT?

- ▶ **AIT** captures, aggregates, and transfers data to information systems
- ▶ **Navy AIT** accepts commercial / DoD marking and labeling standards applied by the manufacturer

AIT Media

- ▶ Bar Coding
- ▶ Radio Frequency
- ▶ SMART cards
- ▶ Biometrics
- ▶ Contact Memory Buttons
- ▶ Optical Memory Cards
- ▶ Personal Digital Assistants
- ▶ Micro-Electrical Mechanical Systems

RAW DATA

FR: YOUR SUPPLIER 123 ANY PLACE CITYTOWN, NJ 07064-7777	TO: USS NEVERSALE BOX 123 ANYPLACE, USA 99999	CARR 
(S) PKG ID: 0662742MV96421234		
(P) CUST PROD ID: AA00211211		
(S) SERIAL NUMBER: 9967PW2MX499837826		
DESCRIPTION: RINGER CIC	PACKAGE COUNT: 1 OF 1	PACKAGE WEIGHT: 3 LBS

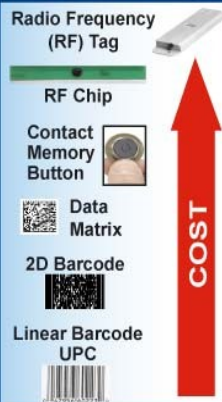
HOW AIT WORKS

Transfer
to
Handheld



Convert
data

DATA CARRIERS



DATA READERS



COST

Automatic Identification Systems

ERP

UICP

RSupply



AIT FUTURE VISION

The Navy vision, as stated in the Navy Logistics AIT Implementation Plan (SEP 2000) is:

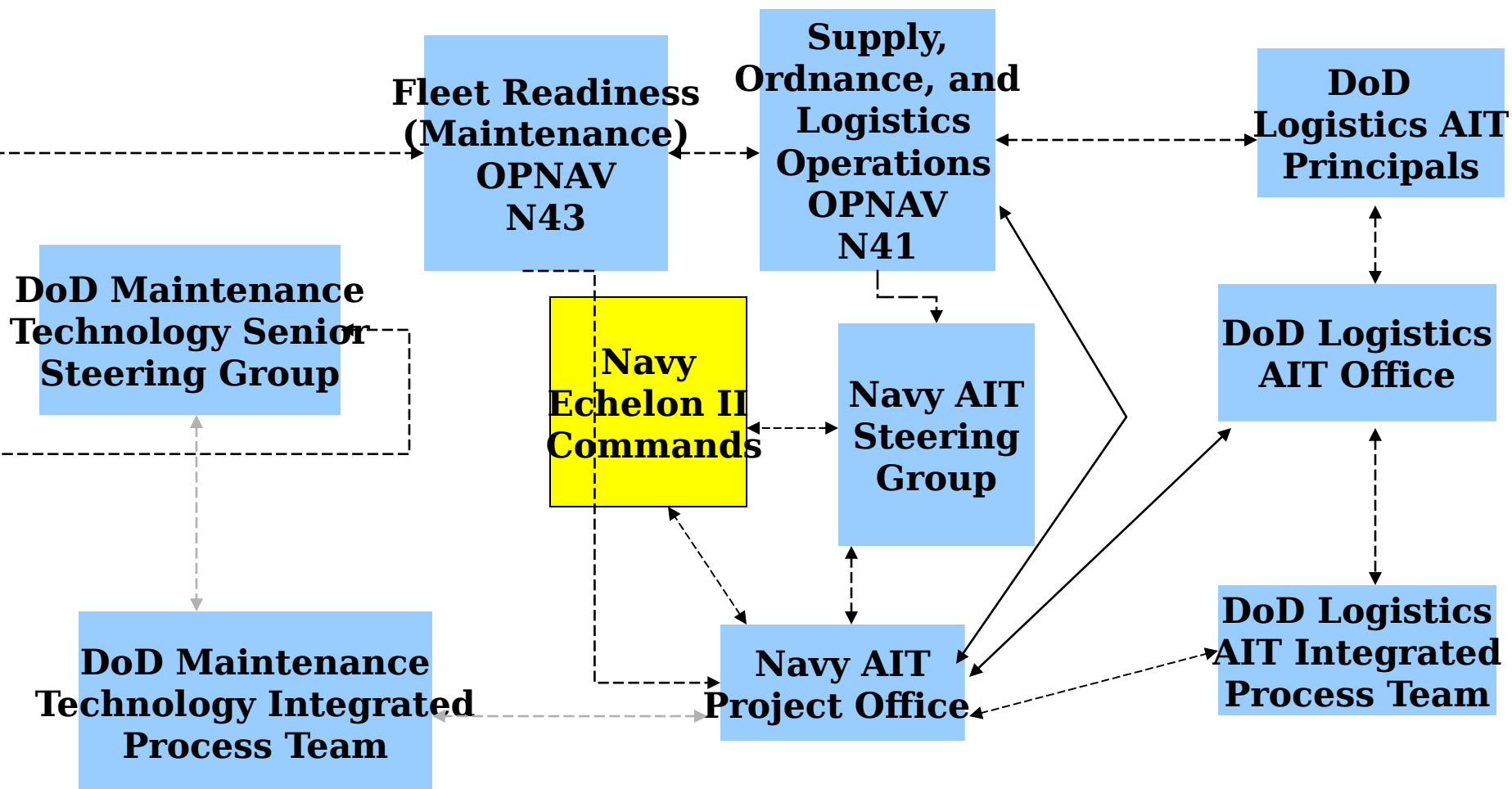
Navy AIT will provide the proper mix of technologies that allows users to efficiently and effectively capture, aggregate, and transfer data and information, and share the data among AISs by using the optimum technology for a particular application. AIT will facilitate data collection and flow to all AISs to better achieve asset visibility with minimal personnel intervention, both afloat and ashore. The Navy vision for AIT is applicable throughout the Navy, though the initial emphasis is on the supply and

ever, we are now in a new phase of AIT/AIDC integration from the shore to end in our Supply Chain and into our ships and ship systems.

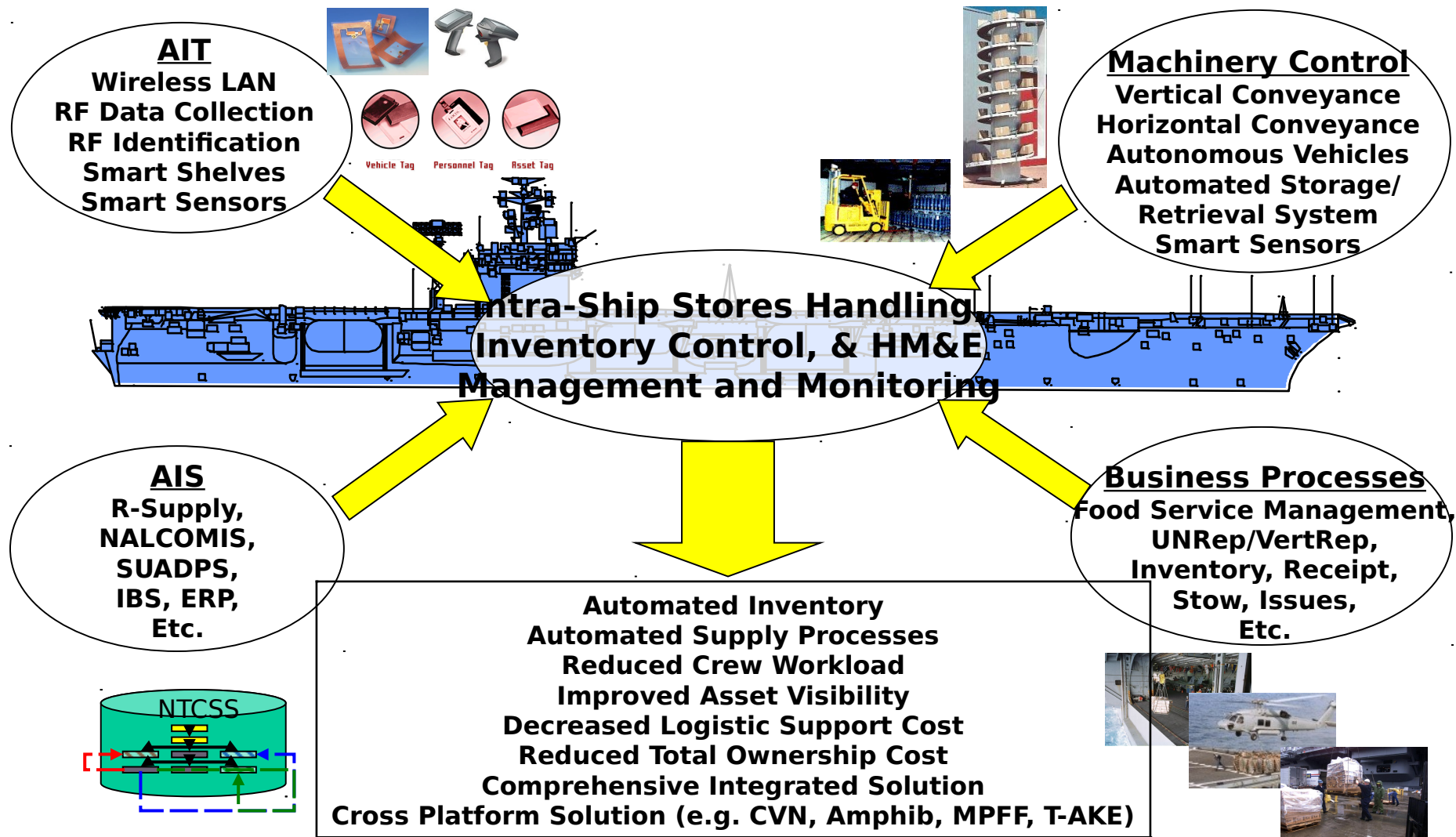


Proposed NAVSEA AIDC Project Vision

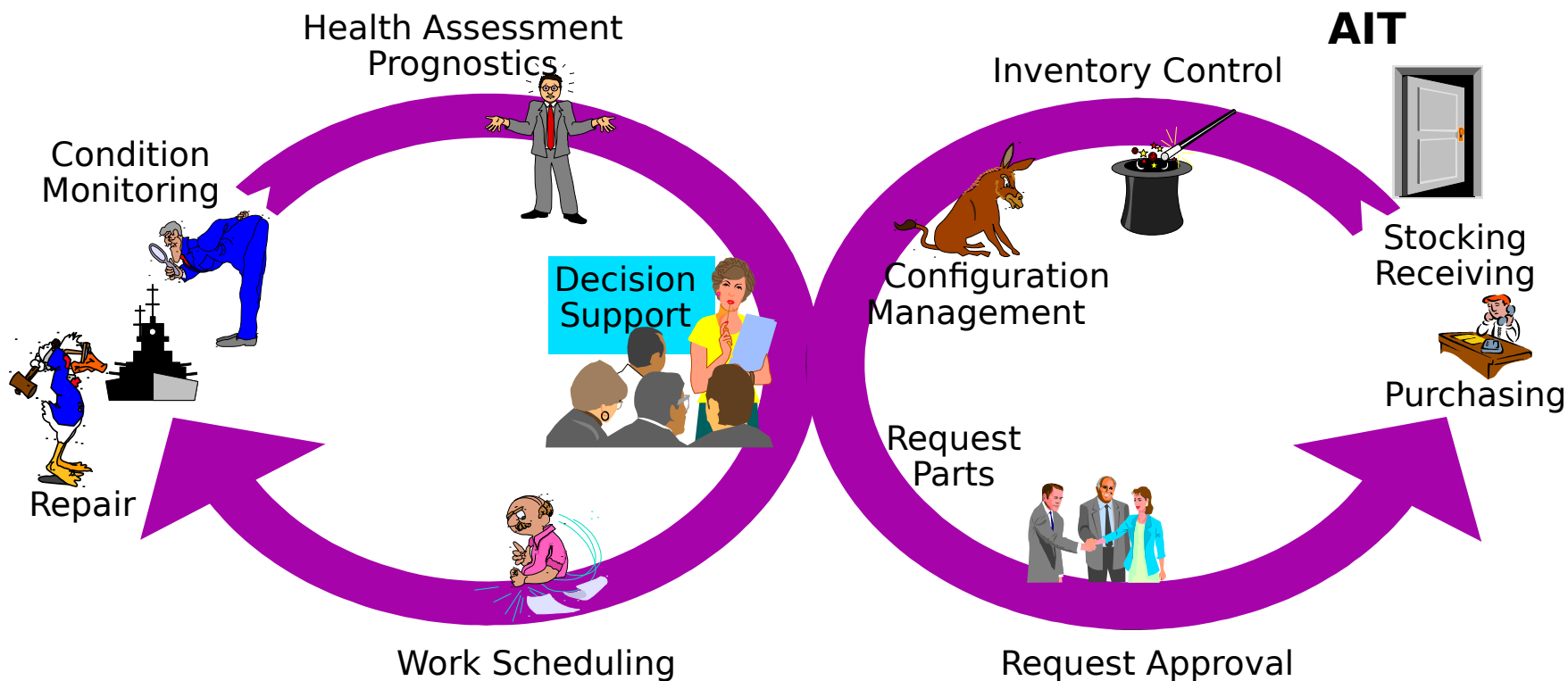
Aggressively exploit Automatic Identification and Data Capture (AIDC) technology in order to transform and perfect NAVSEA business processes involving the identification, location, tracking and monitoring of supplies and equipment both afloat and ashore.



AIDC Enabled Future Capabilities



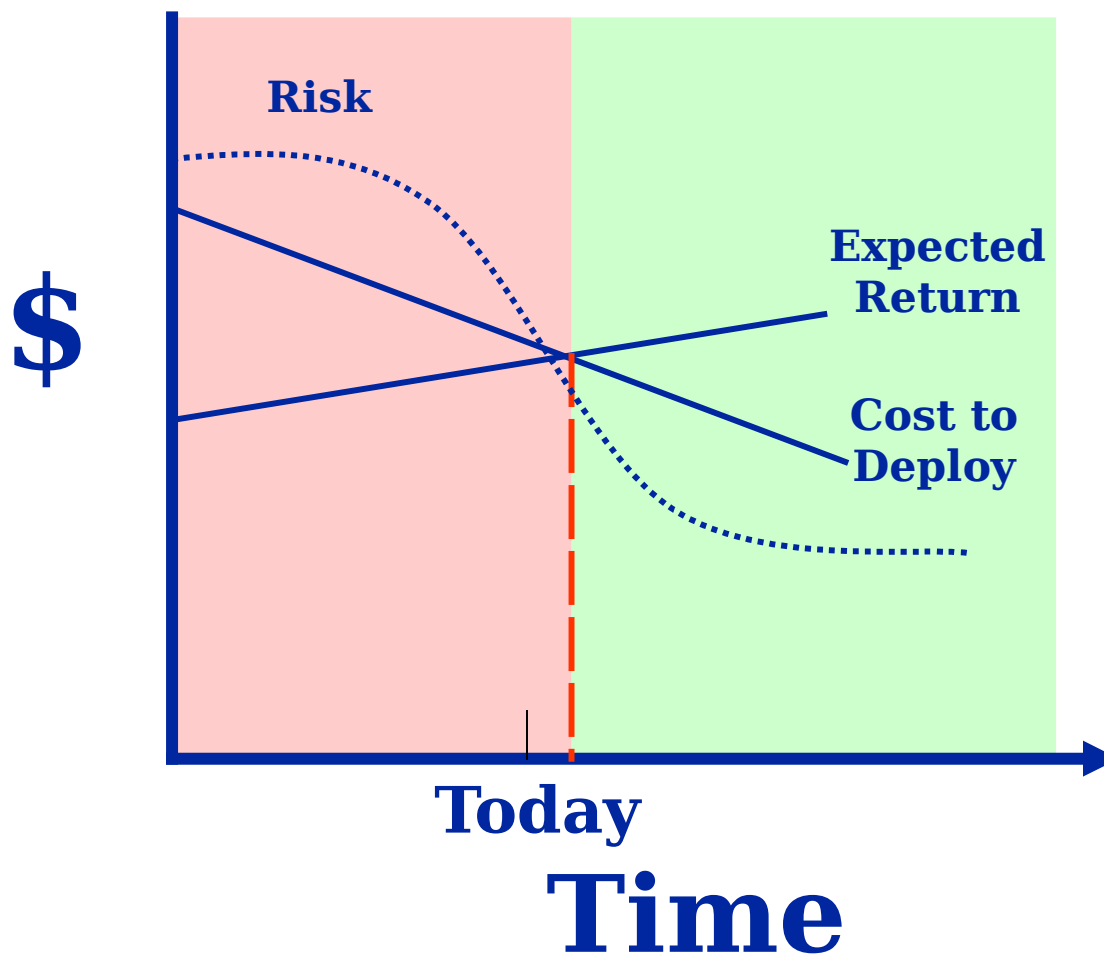
Supply, Maintenance & Monitoring



← Operations → ← Maintenance → ← Supply →

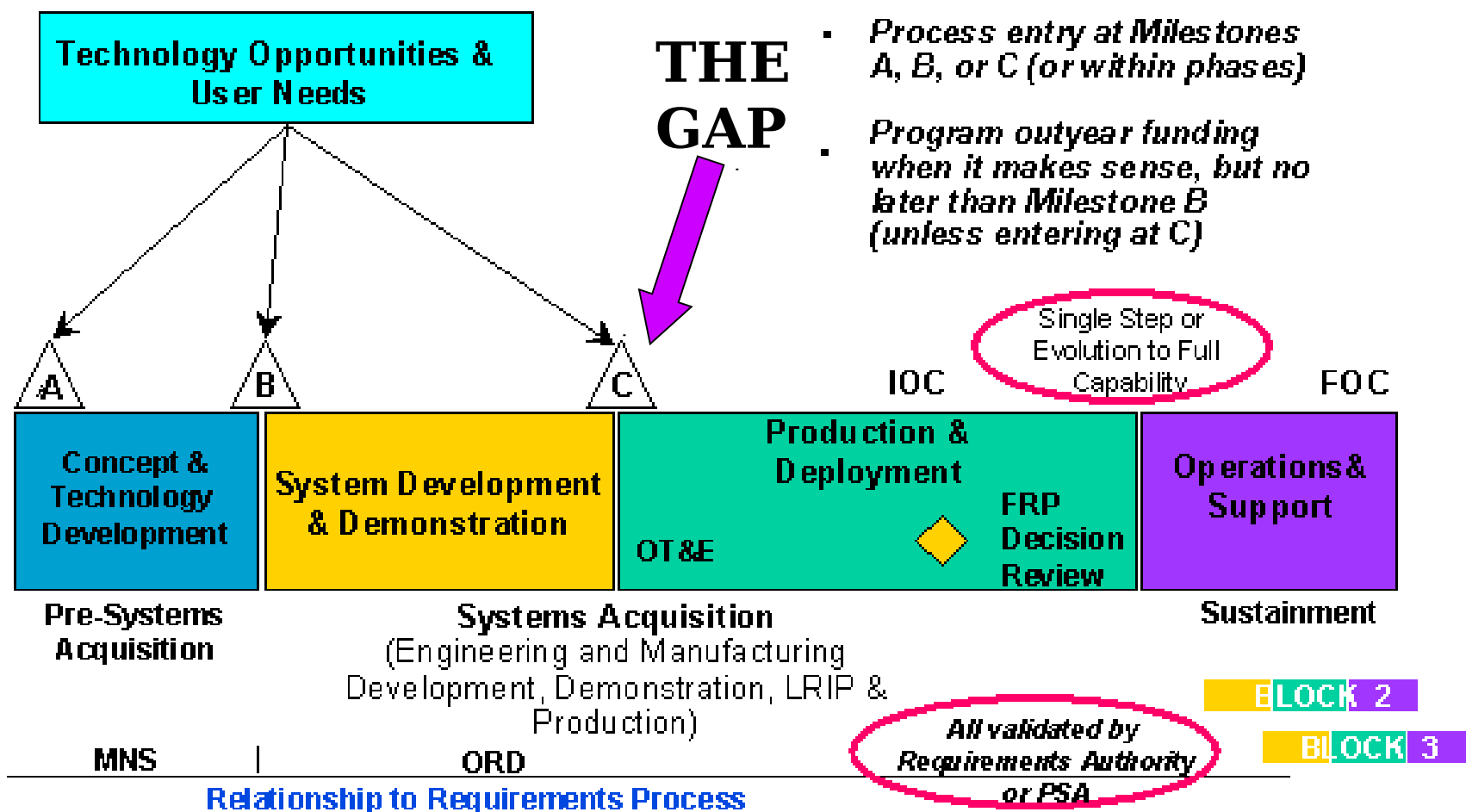
AIDC Decision Point ***Who will make the decisions?***

Decision to Deploy



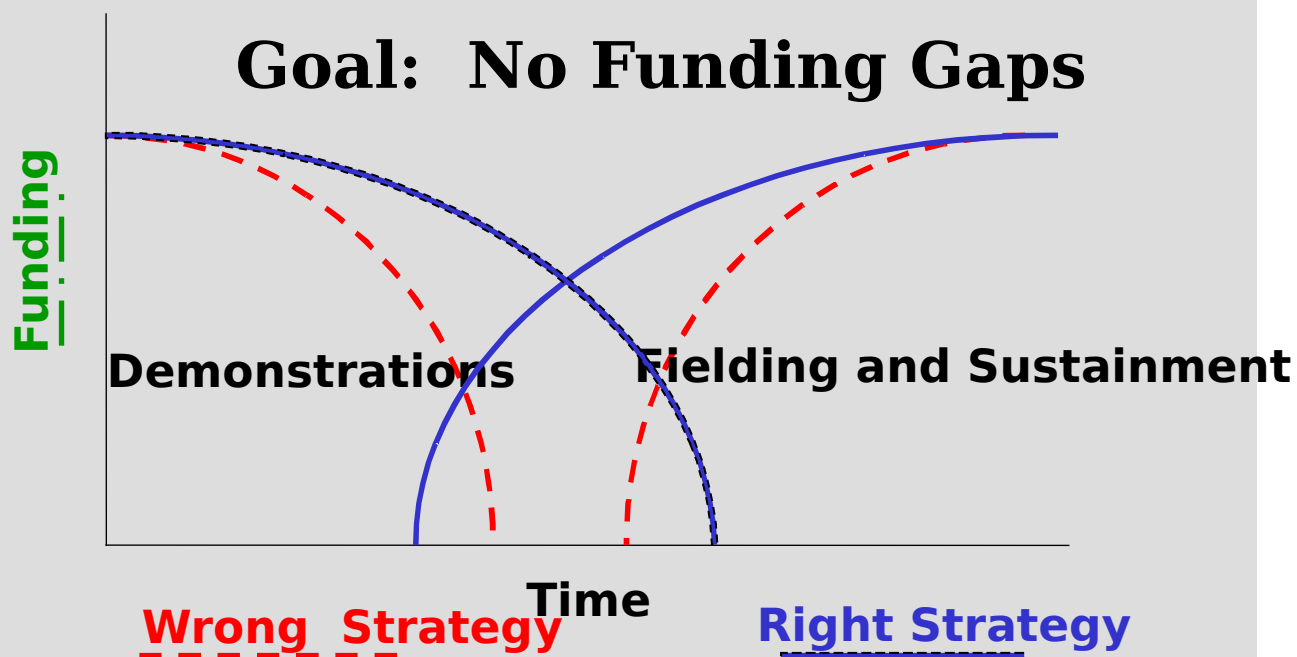
Issue: The Handoff Gap

THE 5000 MODEL



Issue: Funding Continuity

“Technology Insertion Valley of Death”



The AIT Suite

Linear Bar Code



2D Symbol



OMC
Optical Memory Card



STS
Satellite-Tracking System



Smart Card/CA



CMB
Contact Memory Button



Contact
Memory Button

RFID - Active
Radio Frequency ID

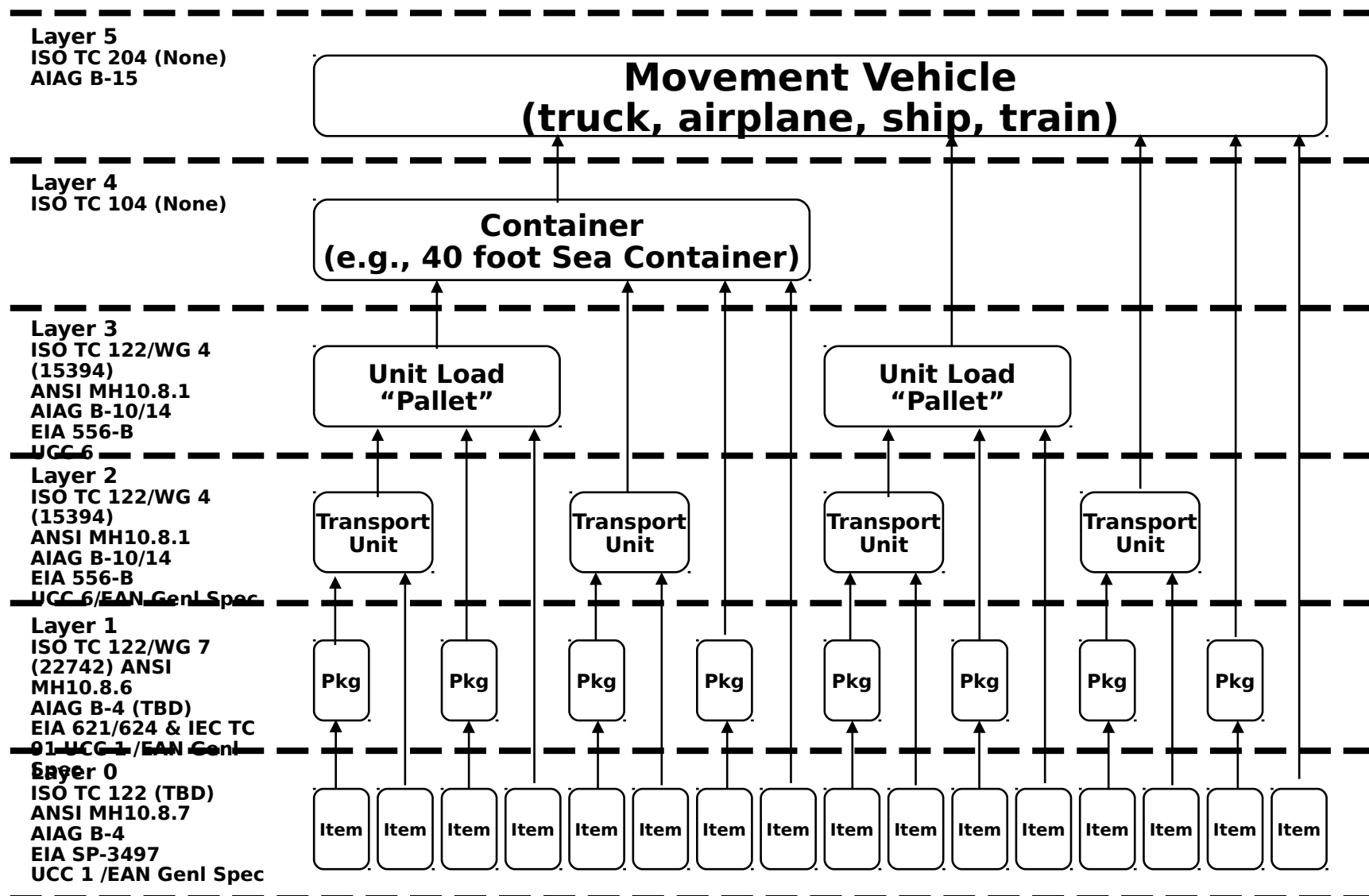


RFID- Passive
Radio Frequency ID

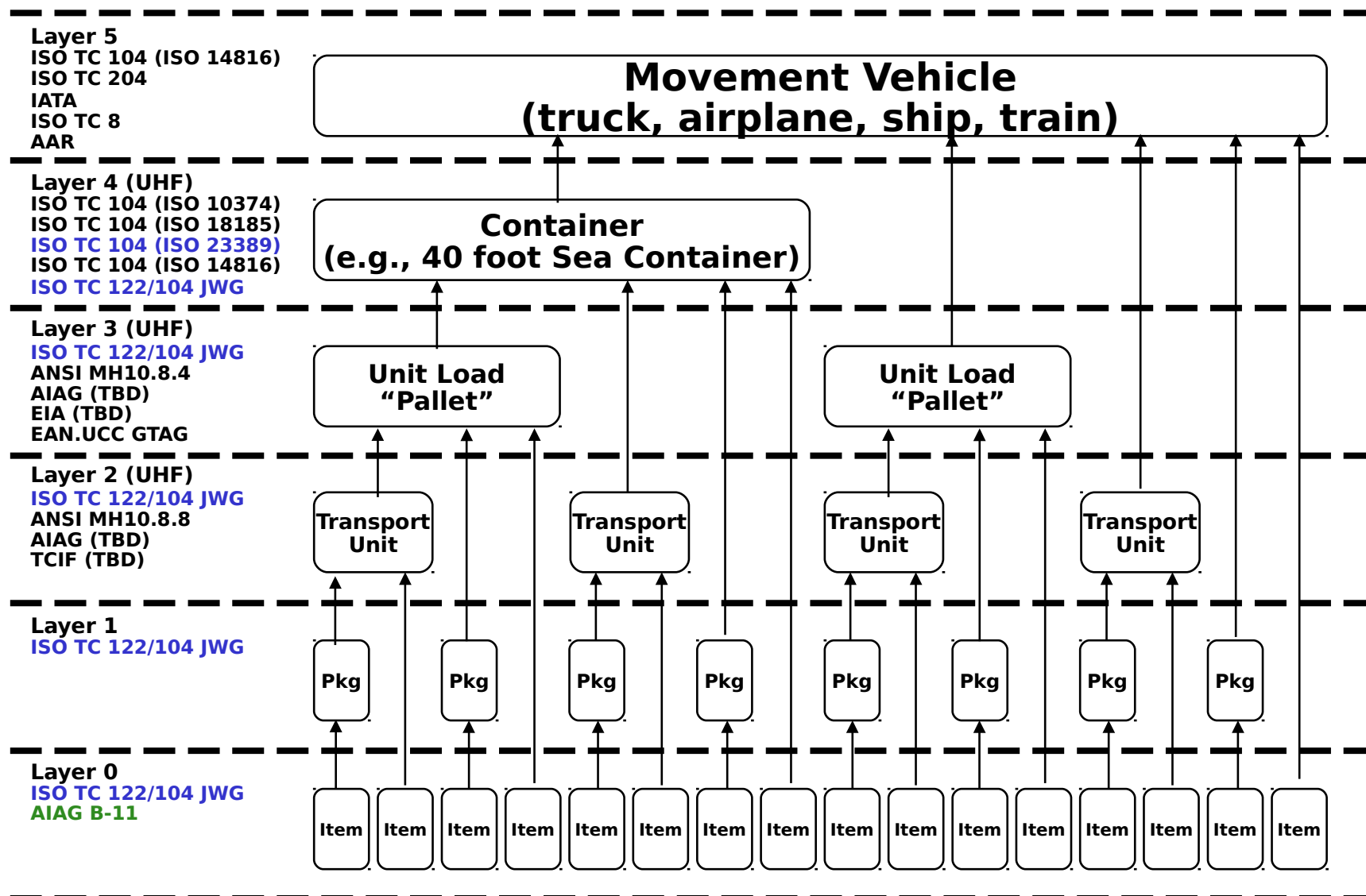


- ◆ **Technology standards**
 - ◆ **Symbology (Bar code, OMC, Contact Memory, RFID, UID, Smart Card)**
- ◆ **Data Standards**
 - ◆ **ANSI/ISO/UCC/EAN**
- ◆ **Compliance and Conformance**
 - ◆ **Print Quality**
 - ◆ **Application Programmers Interface**
 - ◆ **Frequency**
- ◆ **Application Standards**
 - ◆ **Business Process Standards**

The Layers of Logistic Units (Optically Readable Media)

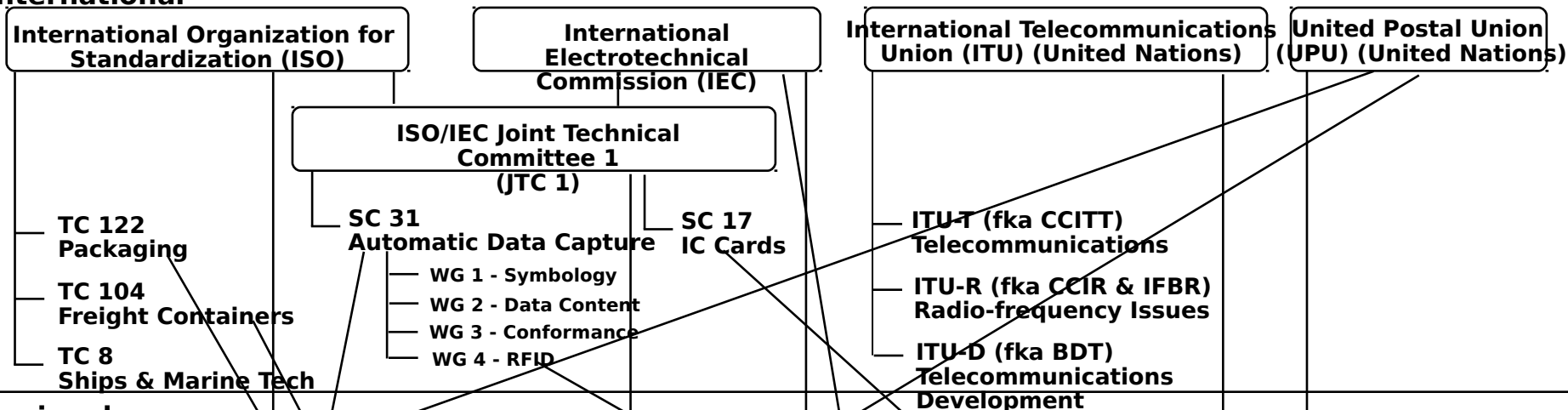


The Layers of Logistic Units (Radio Frequency Identification - RFID)



Standards Organizations

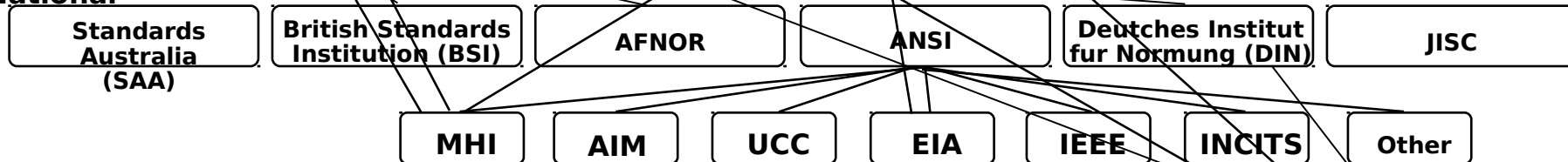
International



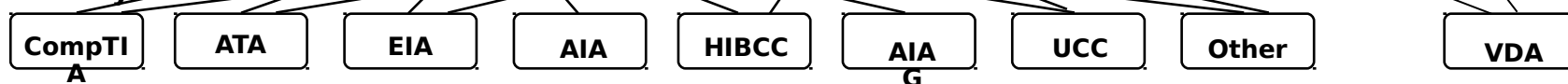
Regional



National



Industry



16 B10

Considerations

- ◆ **AIT crosses disciplines from logistics to maintenance, operations or personnel; any process that has a supporting AIS**
- ◆ **Successful AIT implementation combines engineering, IT, and process owner stakeholders**
- ◆ **Transitioning from an AIT vision to an AIT reality requires an evaluation; both site and process, to select the appropriate medium**
- ◆ **Applied correctly, AIT is high return/low risk; conversely the opposite is also true!**

AIT Enables ERP

HIGH

Total Asset Visibility
Intransit Visibility
Warehouse Operations
Container Contents
Inventory Control
Access Control
Item Marking
Personnel

Applique'
Synthetic Application Radar Tags
Sensor Detection
Dual Model Transponders
Satellite Tracking

COMPLEX

Operational Situation Awareness
Biological Diagnostics
Medical Diagnostics
Transportation Controls
Management Tools
Decision Tools



LOW

Active "Data Rich" Tag
Laser "Optical" Card
Memory Chip / Card
Button Tag, 2D Bar Code
Passive "ID" Tag
Linear Bar Code

SIMPLE

"AIT architecture enables ERP to grow from simple applications to complex situational awareness"

Linear Barcodes

◆ **Code 39 or 3 of 9**

◆ **symbol**
◆ **DoD Standard**

◆ **40 ASCII character set**

◆ **capacity**
◆ **Durable**

◆ **Widely used**

◆ **License plate information linked to
database record**

◆ **Read with linear/2D/CCD**

Scanner

◆ **Reproduced on specialty/laser
printers**



“Easy, reliable, cost effective”

2D Barcodes

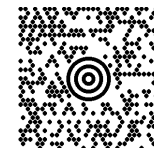
PDF417

-  Ability to carry large amounts of data within a symbol on shipping cartons and documents



MaxiCode

-  Ability to be quickly located by high speed sortation equipment due to its built-in “bulls-eye” pattern



Data Matrix

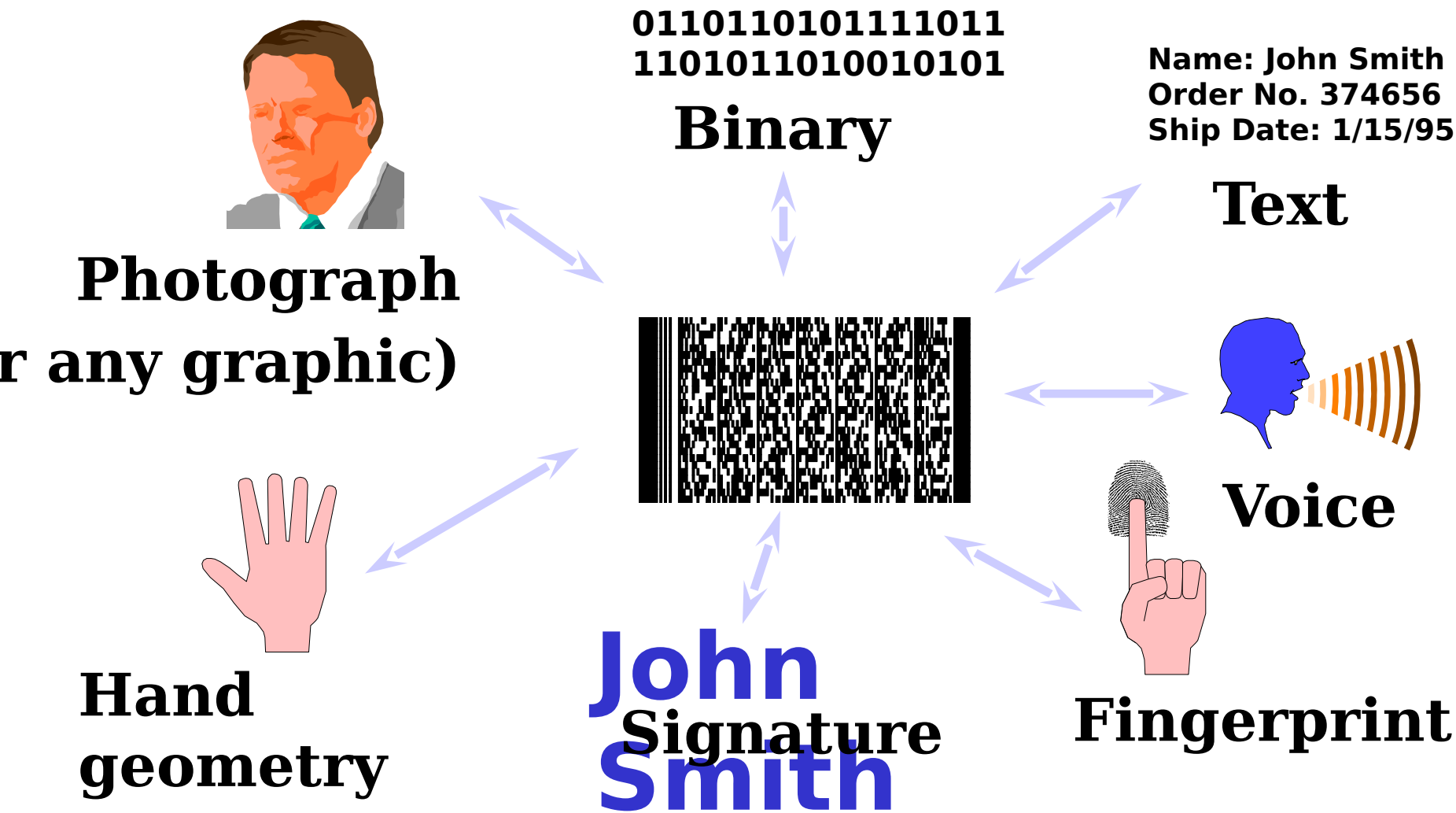
-  Ability to carry data in a small area, a silicon chip for example



“Documentation must specify the type of 2D barcode”



2D Barcode Supports All Information Types










Barcode/2D Use in Industry Supply Structure





Barcode Advantages/Disadvantages

Advantages

-  **Commercial Sector leverage**
-  **Numerous sources of supply**
-  **Abundant 3rd party support**
-  **Ease of implementation**
-  **Established standards**
-  **Proven ROI**
-  **Inexpensive**

Disadvantages

-  **Limited data capacity**
-  **Potential for damage**
-  **Static vs dynamic data**



Contact Memory Buttons

- ◆ **Highly versatile, Electrically Erasable Programmable Read-Only Memory (EEPROM) based storage device**
 - ◆ **Up to 2M capacity**
 - ◆ **Hermetically sealed - survives almost all forms of environmental exposure, temperature extremes of -85 to +450 degrees**
 - ◆ **16mm x 5mm or 5mm x 3mm, “battery-less”, limitless data retention, numerous mounting techniques**
 - ◆ **Read/write capability, data transfer rate in milliseconds**
 - ◆ **Waterproof, non-corrosive, and robust**

“ Compact, durable, abundant storage ”

Contact Memory Buttons Advantages/Disadvantages

◆ Advantages

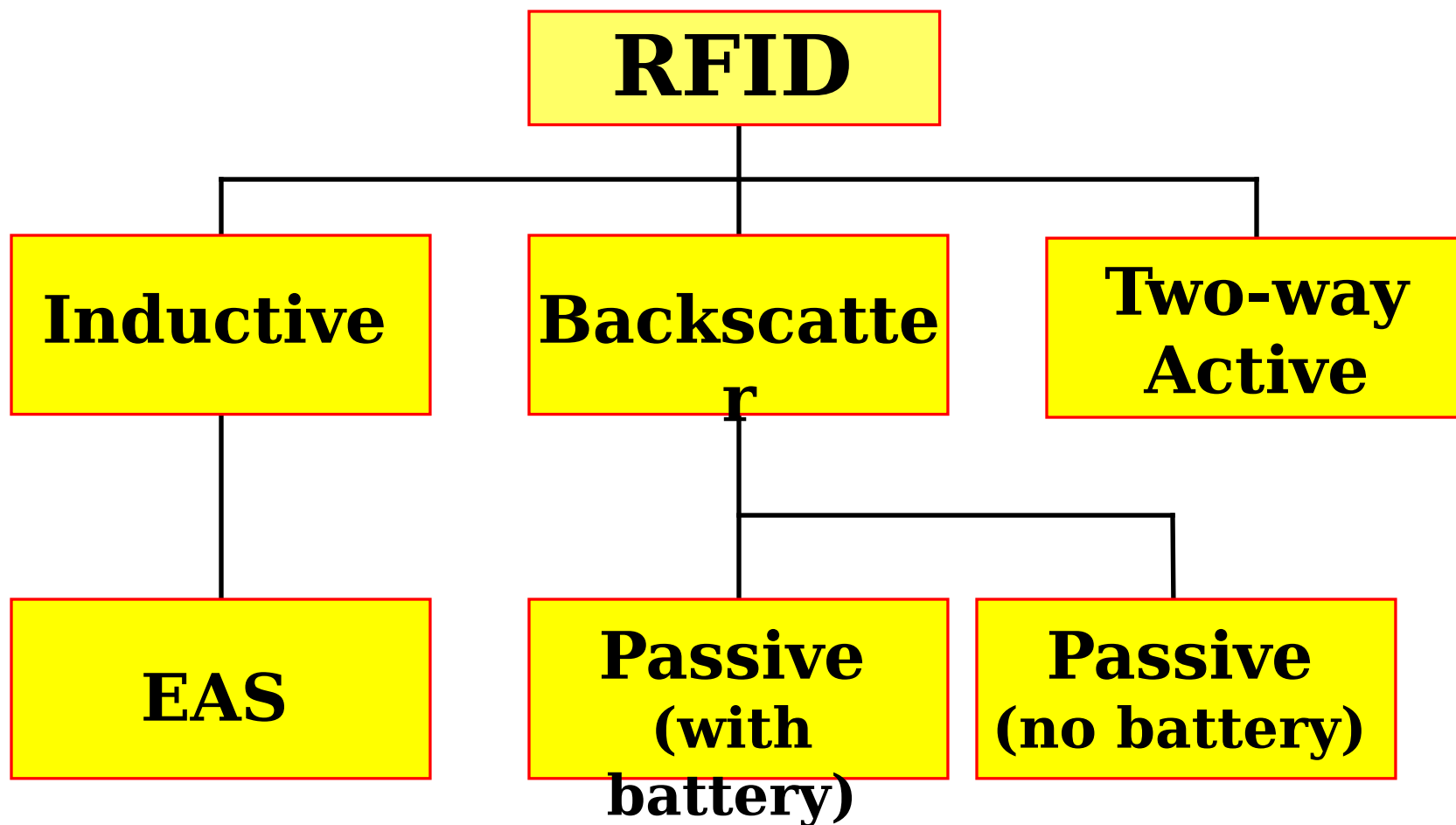
- ◆ **Virtually indestructible**
- ◆ **High data capacity AIT medium**
- ◆ **Ideal for maintenance applications**
- ◆ **Expansive read/write capability**
- ◆ **Stand-alone data file**

◆ Disadvantages

- ◆ **Relatively expensive**
- ◆ **Limited vendor selection**
- ◆ **No existing standards**

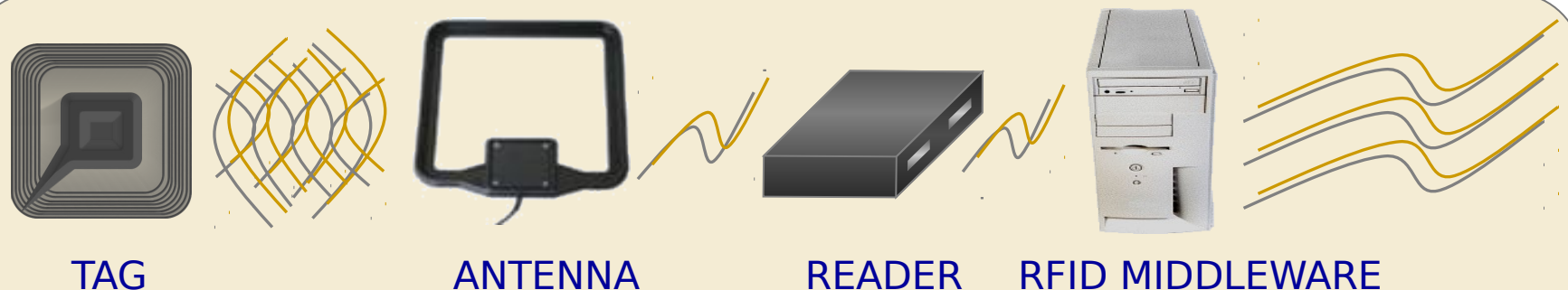


Basic Types of RFID



RFID Process

“RFID is simply about using radio waves to automatically identify physical items in varying proximity to readers which can uniquely identify them.”



The basic process:

- 1. The RF Antenna broadcasts a signal**
- 2. Tag Enters the RF field**
- 3. RF Signal powers the Tag**
- 4. Tag transmits data to the reader**
- 5. Reader interacts directly with a System**

What is RFID?

(Active vs Passive Tags)

Characteristics

- Energy Source
- Read Distance
- Memory
- Life Time
- Tech Maturity Level
- Weight
- Cost

Active & Passive Characteristics:

- Transmits and receives data
- Utilizes computer chip and antenna
- Range in capabilities from simple, unique
- 'license plate' to encryption, memory &
- read/write capability

ACTIVE (non-disposable)

Higher Cost, Larger Size

Battery

5 to 300 meter

64K-228K

2 to 7 years

Low

50/>200 gram

\$20 - \$100+



PASSIVE (disposable)

Thin, low cost

Induction

approx. 6 meters

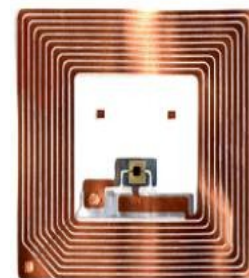
64 bits - 8K

up to 10 years

Medium

.5 gram (excl. pkg)

\$.30 - \$5



RFID POLICY

- Implement high data capacity active tags on containers (seavan/air pallet)
- Requires Supplies to put passive RFID tags on case & pallet level
- OSD/DoD RFID IPT Working Groups with Navy Leads formed: Business Roles - OPNAV N41/CDR MacDonald
- Implementation - NAVSUP 429/Lillian Grieco
- Technical - NAVSUP 4213/Navy AIT PO - Lorrev
- OSD/DoD RFID Industry Summit - Dec 03
- RFID Demonstration Pilots - Jan 04
- RFID Demo Analysis & Lessons Learned - May 04
- Final RFID Policy & Implementation Strategy - Jun 04
- OSD (AT&L) Policy at: <http://www.dodait.com/>

Published
2 Oct 2003



RFID Implementation Do's

- ◆ **Coordinate throughout Navy to support infrastructure (interrogator installation)**
- ◆ **Based on collaborative Navy RFID Implementation Plan (EII commands) expected to read/write tags**
- ◆ **Based on “inexpensive” RFID tags**
- ◆ **Fill a “gap” or “seam” in existing TAV**
- ◆ **Focus on data to be captured rather than the hardware device**
- ◆ **Limit data from RFID tags to specific purposes (e.g., active tags on engine containers)**
- ◆ **Apply data security measures, encrypt data where required, meet FIPS-140 requirements**
- ◆ **HERO tested and certified**
- ◆ **Able to use non-proprietary protocol for tag communication**
- ◆ **Operational on frequency spectrum approved by varied foreign countries and in compliance with ISO/ANSI standards**

RFID Summary

- ◆ **AIT crosses all functional applications and classes of supply;**
 - ◆ No “one size fits all” solution
 - ◆ RFID one tool in the toolkit
- ◆ **Navy supports use of RFID where it makes sense**
 - ◆ Navy notes Joint value of RFID in theater
 - ◆ Navy will continue to address and support RFID requirements for ITV
 - ◆ SAVI Active Tags where required
 - ◆ NAVSUP exploring other RFID Active Solutions
 - ◆ Passive Tags will improve process improvements
- ◆ **Technology only one aspect - standards, data, systems, communications, training, life cycle maintenance are others**

Policy before technology...standardization before implementation



Which technology for which application?

- ✓ **How far?**
- ✓ **How fast?**
- ✓ **How many?**
- ✓ **How much?**
- ✓ **Geometry of tagging space**
- ✓ **Interferers (physical and radio)**